أكاديمية البحث العلمي والتكنولوجيا
مجلس بحوث الثروة المعدنية
شعبة الخرائط المتخصصة

وزارة الصناعة والتنمية التكنولوجية
الهيئة العامة للمساحة
الجيولوجية والمشروعات التعدينية

المذكرة التفسيرية
الخريطة الميتالوچينية لمصر
مقياس ١: مليون

الهيئة المصرية العامة للمساحة الچيولوچية
والمشروعات التعدينية

القاهرة - ٢٠٠١

ASRT
The Egyptian Academy
of Scientific Research&Technology
Council of Mineral Resources
Specialized Maps Committee

The Ministry of Industry
& Technology
Egyptian Geological Survey
&Mining Authority

Explanatory Note
The Metallogenic Map of Egypt
Scale 1:1,000,000

The Egyptian Geological
Survey and Mining Authority

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Explanatory Note
The Metallogenic Map of Egypt
Scale 1: Million

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Survey and Mining Authority

Cairo – 2001

CONTENTS

Part One

I- THE NEW METALLOGENIC MAP FOR EGYPT
Abdel Aziz A. Hussein

I-1- INTRODUCTION:

Mineral deposits represent one of the most important and vital natural resources of the country, on which its sustainable development depends. Mineral raw materials are the base for many industries, construction, land reclamation, fertilizers and for exportation.

So, it is essential to define the resource and locate the site, and present all data in a way that helps to find out the best means of exploitation.

The metallogenic map is the mean for presenting these data and making them available for the scientist, exploration geologist, investor and those interested in exportation of mineral commodities.

The metallogenic map differs from the mineral location map in so many aspects. It presents not only the location of the ore site, but also enough information concerning the metal (s) contained in the ore, the genetic type of mineralization, the host rock, the environment under which the ore was formed as well as the age of mineralization. Being so, the metallogenic map helps to direct efforts of exploration toward more promising areas (**Metallogenic Provinces**) and to rocks formed under the most favourable **Metallogenic Epochs.**Thus saving money and effort.

The preparation and publication of a metallogenic map for the country not only attracts finance but also is in keeping with the scientific shaping of the world and making available all data related to the improvement of the quality of life.

The Egyptian Geological Survey realized the need for a metallogenic map for Egypt in the late seventies. Its efforts resulted in the preparation and publication of two sheets, scale 1:500,000 for Aswan and Qena. These are good metallogenic maps, but limited to some parts of the country.

The Committee for Specialized Maps, Council of Mineral Resources of the Egyptian Academy for Scientific Research & Technology saw the need for a metallogenic map for the whole of Egypt. The subject was discussed in many meetings during the period 1988-1990. A proposal was submitted to the Academy, and the project was awarded to the Egyptian Geological Survey

and Mining Authority as the Principal Executing Agency. The contract was signed on 30/6/1991. The working teams were formulated. It included scientists and experts from the different universities and research institutions to guarantee the participation on the national level and of the highest standard in the country.

I-2- THE WORKING TEAM:

The project was headed by **Ahmed Atef Dardir,** the, then, Chairman of The Egyptian Geological Survey and Mining Authority. Two deputies were named for the project:**Abdel Aziz A. Hussein** (EGSMA) and **Maher Azmy Takla** (Cairo University). Nine specialized groups of experts were named, representing all concerned institutions to carry on the work of the project. These were as follows:

Group 1: Preparation of the Legend and Presentation of Data
Reporter **Abdel Aziz A. Hussein** (EGSMA)
(Comprises 10 experts).

Group 2: Compilation of Data, Published and Unpublished
Reporter **Samir El Gaby** (Assiut University), Deputy Reporter: **Ferial M. El Bideiwy** (EGSMA)
(Comprises 20 experts).

Group 3: Collection of Data on Ores
Reporter **Esmat Fawzi Guirgis** (EGSMA)

Group 4: Ores in Association with Basement Rocks
Reporter **Maher Azmy Takla** (Cairo University)
(Comprises some 20 experts).

Group 5: Ores in The Sedimentary Cover
Reporter **Mortada M. El Aref** (Cairo University)
(Comprises 10 experts).

Group 6: Building Materials and Ornamental Stones
Reporter **Bakr A. El Nassan** (Consultant Geologist)
(With 20 experts).

Group 7: Nuclear Materials
Reporter **Abdalla A. Abd El Monem** (N.M.A)
(Comprises 15 experts)

Group 8: Compilation of Geological Maps and Preparation of Base Maps.
Reporter **Maurice H. Hermina** (Consultant Geologist)
(Assisted by 20 experts and cartographers)

Group 9: Data Base Management
Reporter **Ferial M. El Bideiwy** (EGSMA)
(With 20 experts in computers and data bases)

Coordinator to the Map Project
Esmat Fawzi Guirgis.

The Academy named three outstanding and competent geologists to act as "An Evaluation Committee". The Committee is to evaluate, and approve the progress and final reports submitted by the Working Team.

The **Evaluation Committee** members were:
- **M. Kamal El Akaad** (Tanta University)
- **Morad I. Youssef.** (Ein Shams University)
- **M. F. El Ramly** (Ex. EGSMA Chairman).

The **Geological Consultative Committee** included:
S. El Gaby; Emad R. Philobbos (Assuit University), **Gaber M. Naim,** (EGSMA), **Mohamed S. Afia** (Consultant Geologist) and **Mohamed El Hinnawi** (EGSMA).
The Financial Coordinator was **Ahmed M. El Ghorori.**

The Editorial Board for the Metallogenic Map & accompanying texts included:
A.A. Dardir (Editor in Chief), **A. A. Abdel Monem, M.M. El Aref, S. El Gaby, E.F. Guirgis, M.H. Hermina, Abdel Aziz A. Hussein, B.A. El Nassan, E.R. Philobbos and M.A. Takla.**

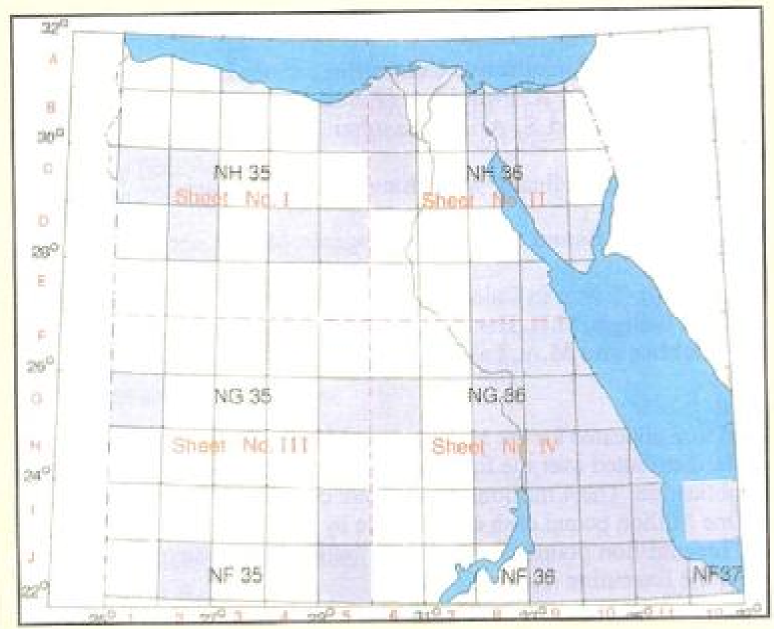
Budjet:
Total sum allocated for the Metallogenic Map Project is **4 Million Egyptian Pounds,** distributed over the four years period needed for the map preparation and publication. The 4 million pounds were contributed as follows:
1- One Million pound cash contribution by the Academy.
2- Three million pounds in kind contribution by the Egyptian Geological Survey, the Executing Agency.

In addition, some 250,000 pounds were to be contributed in kind by the other participating agencies.

I-3- WORK PROCEDURE:
It was planned to issue the Metallogenic Map of Egypt on the scale of 1:1,000,000 in 4 sheets covering 1 million km^2. Latitude 27°00'N and Longitude 30°00'E are to be the border lines separating these sheets. The sheets were given the numbers I,II,III and IV. (Fig.1)

Fig 1

The Four Sheets of The Metallogenic Map 1 : 1,000,000



STUDIED AREAS

The metallogenic symbols for the deposits are printed in dark colours over a simplified geologic base printed in much paler colours. Deposit symbols present all details concerning the geological environment and age of the deposit.

The bulk of data concerning the deposits accumulated during the production of the map are stored in a special data base under the name "Mineral Data Bank" in the Documentation Centre of EGSMA. This is available as a reference for any further study on the Egyptian minerals, ores and rocks.

I-4- PREPARATION OF THE MAP

The Topographic Base:

Transverse Mercator Projection was used for the topographic base map. Maps, scale 1:1,000,000. (The Military Survey of Egypt, 1990), and the Working Sheets. Scale 1:250,000. (EGPC-Conoco Coral, 1983). were used for the preparation of the topographic base map. The map shows, in addition to topographic features, important towns, roads and railways. The boundaries between the different governorates are mapped in accordance with the Ministry of Local Governorates maps and regulations. **Geographic names on the maps are transliterated according to the UN Resolution for Transliteration and Spelling approved in 1973.**

The Geological Base:

The geological base to the Metallogenic Map was based on:

- The Geological Map of Egypt, 1:500,000, (Conoco-Coral 1987).
- The Geological Map of Sinai, 1:250,000 (EGSMA, 1993).
- The Geological Map of Egypt, 1:2,000,000, (EGSMA).

Cartographic Work:

- Base Map (aerial photos, Landsat images, topographic base).
- Green Base (on plastic non-shrink paper using green glue so that any data can be plotted in different colours after transfering the negative to green positive).
- Legend colours are chosen by mixing of the main colours: yellow, red, and cyan in different percents, together with screening and hashuring.

II- THE LEGEND

To select a legend for the metallogenic map of Egypt, many legends for maps published by different countries were reviewed by Group 1 (Preparation of the Legend and Presentation of Data), and it was decided to adopt that used for the "Metallogenic Map of South East Asia", published by the UNESCO in "1985", with the introduction of modifications needed to suit the local geological and metallogenic considerations. The selection of the South East Asia legend was mainly due to:

1- At that time, it was the most up-to-data legend which benefitted from all previously designed legends.

2- It was already approved by the Geological Map of the World Committee of the UNESCO, and recommended as a base for future legends.

3- It was found suitable for the local geology and could be adapted for the mineral deposits known in Egypt.

So, the Legend Sheet of the Metallogenic Map of Egypt, scale 1:1.000,000 was designed to include:

- A legend for the geological base.
- A legend to explain the Metallogenic Symbols used to mark the lcoations of the depsosits.
- Other relevant information such as location maps, sources of information, etc.....

II-1 The Geological Base Legend

As stated above, the legend of the geological maps used has to be simplified to prepare for the geological base of the Metallogenic Map. The simplification was carried out mainly through the amalgamation of units since the subdivisions are unimportant from a metallogenic point of view. So, the legned for the Precambrian terrane was simplified to be as shown in Fig. 2. Here only eight rock units, each identified with a specific colour and letter symbol, are given: From oldest to youngest, these are.

- The old continental crust of Pre Pan-African gneisses, migmatites and high grade schists. These may host some of the BIF deposits.

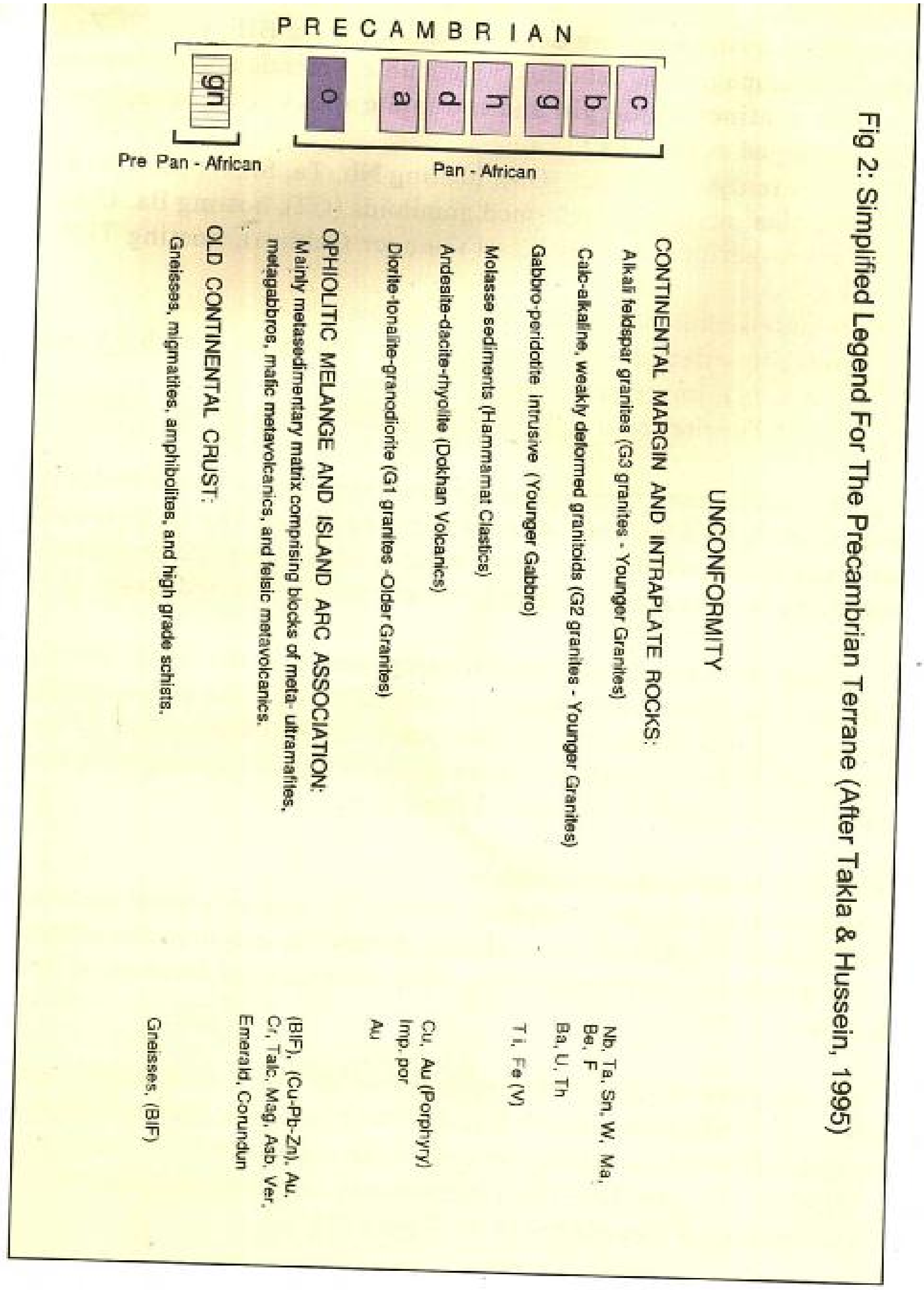


Fig 2: Simplified Legend For The Precambrian Terrane (After Takla & Hussein, 1995)
PRECAMBRIAN
c
b
g
h
d
a
o
gn
Pan - African
Pre Pan - African
UNCONFORMITY
CONTINENTAL MARGIN AND INTRAPLATE ROCKS:
Alkali feldspar granites (G3 granites - Younger Granites)
Nb, Ta, Sn, W, Mo, Be, F
Calc-alkaline, weakly deformed granitoids (G2 granites - Younger Granites)
Ba, U, Th
Gabbro-peridotite intrusive (Younger Gabbro)
Ti, Fe (V)
Molasse sediments (Hammamat Clastics)
Andesite-dacite-rhyolite (Dokhan Volcanics)
Cu, Au (Porphyry)
Imp. por
Diorite-tonalite-granodiorite (G1 granites -Older Granites)
Au
OPHIOLITIC MELANGE AND ISLAND ARC ASSOCIATION:
Mainly metasedimentary matrix comprising blocks of meta- ultramafites, metagabbros, mafic metavolcanics, and felsic metavolcanics.
(BIF), (Cu-Pb-Zn), Au, Cr, Talc, Mag, Asb, Ver, Emerald, Corundum
OLD CONTINENTAL CRUST:
Gneisses, migmatites, amphibolites, and high grade schists.
Gneisses, (BIF)

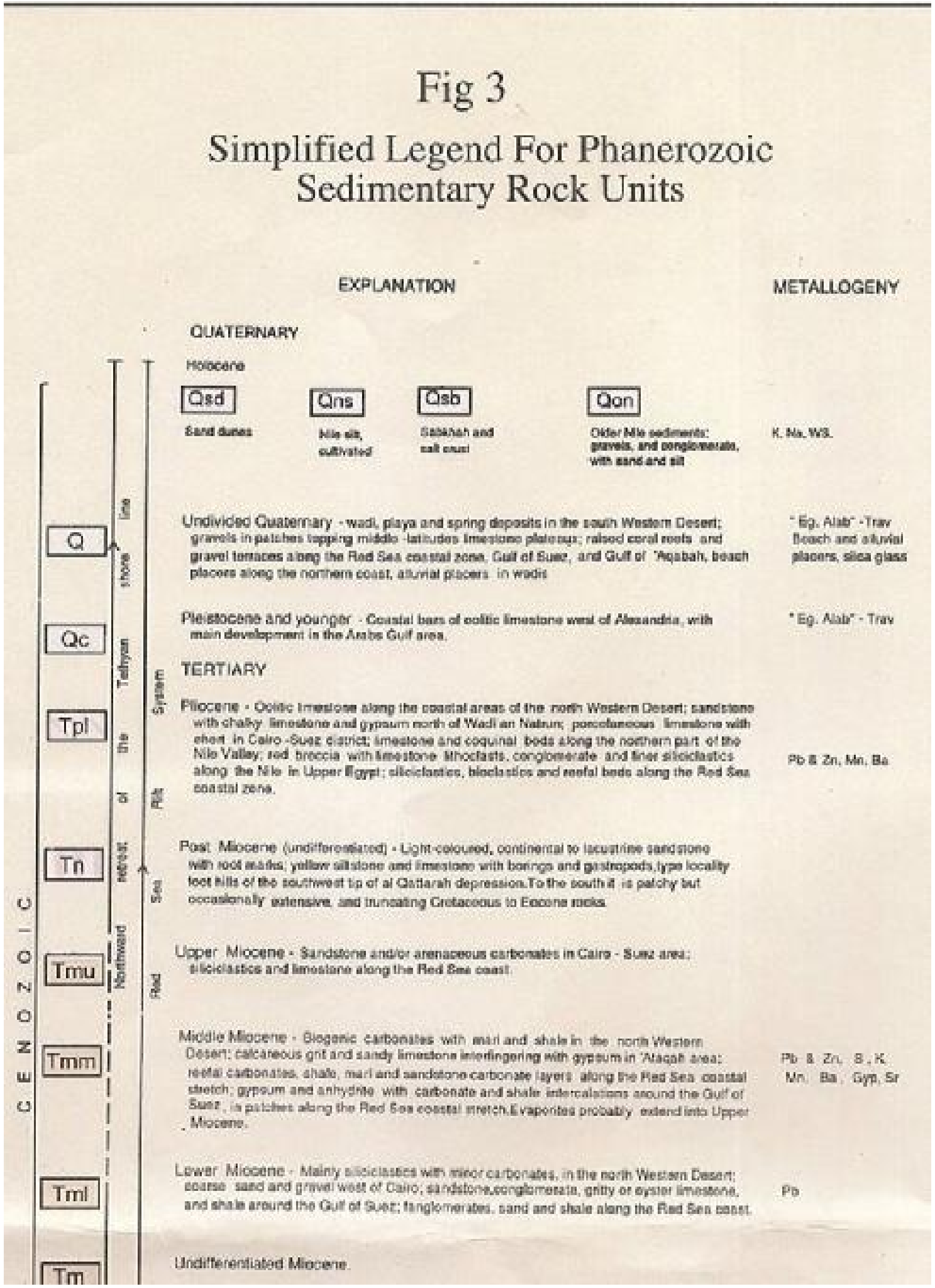


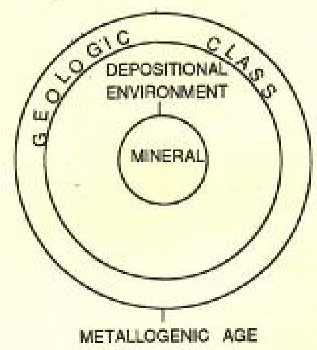
Fig 3
Simplified Legend For Phanerozoic Sedimentary Rock Units
EXPLANATION
METALLOGENY
QUATERNARY
Holocene
Qsd
Sand dunes
Qns
Nile silt, cultivated
Qsb
Sabkhah and salt crust
Qon
Older Nile sediments: gravels, and conglomerate, with sand and silt
K, Na, WS.
Q
Undivided Quaternary - wadi, playa and spring deposits in the south Western Desert; gravels in patches topping middle -latitudes limestone plateaus; raised coral reefs and gravel terraces along the Red Sea coastal zone, Gulf of Suez, and Gulf of 'Aqabah, beach placers along the northern coast, alluvial placers in wadis
"Eg. Alab" -Trav Beach and alluvial placers, silica glass
Qc
Pleistocene and younger - Coastal bars of oolitic limestone west of Alexandria, with main development in the Arabs Gulf area.
"Eg. Alab" - Trav
TERTIARY
Tpl
Pliocene - Oolitic limestone along the coastal areas of the north Western Desert; sandstone with chalky limestone and gypsum north of Wadi an Natrun; porcelaneous limestone with chert in Cairo -Suez district; limestone and coquinal beds along the northern part of the Nile Valley; red breccia with limestone lithoclasts, conglomerate and finer siliciclastics along the Nile in Upper Egypt; siliciclastics, bioclastics and reefal beds along the Red Sea coastal zone.
Pb & Zn, Mn, Ba
Tn
Post Miocene (undifferentiated) - Light-coloured, continental to lacustrine sandstone with root marks; yellow siltstone and limestone with borings and gastropods,type locality foot hills of the southwest tip of al Qattarah depression.To the south it is patchy but occasionally extensive, and truncating Cretaceous to Eocene rocks
Tmu
Upper Miocene - Sandstone and/or arenaceous carbonates in Cairo - Suez area; siliciclastics and limestone along the Red Sea coast
Tmm
Middle Miocene - Biogenic carbonates with marl and shale in the north Western Desert; calcareous grit and sandy limestone interfingering with gypsum in 'Ataqah area; reefal carbonates, shale, marl and sandstone-carbonate layers along the Red Sea coastal stretch; gypsum and anhydrite with carbonate and shale intercalations around the Gulf of Suez, in patches along the Red Sea coastal stretch.Evaporites probably extend into Upper Miocene.
Pb & Zn, S, K, Mn, Ba, Gyp, Sr
Tml
Lower Miocene - Mainly siliciclastics with minor carbonates, in the north Western Desert; coarse sand and gravel west of Cairo; sandstone,conglomerate, gritty or oyster limestone, and shale around the Gulf of Suez; fanglomerates, sand and shale along the Red Sea coast.
Pb
Tm
Undifferentiated Miocene.
CENOZOIC
Northward retreat of the Tethyan shore line
Red Sea Rift System

Era	Symbol	Unit	Mineral occurrences
	Tv	Oligo - Miocene - Basalts and dolerites. Peridotite	peridot
	To	Oligocene - Clastics and gravel sheets in the Cairo - Suez and Cairo- al Fayyum - al Bahariyah stretches and on top of Eocene plateau west of the Nile, conglomerate, siltstone, porcelaneous limestone in central Sinai; conglomerate in al Qusayr - Safajah area; argillaceous limestone, at the foot of as Sallum scarp in the Western Desert	Kaol. Fe. Och. " Eg. Alab" - Trav, WS. Bent
	Teu	Upper Eocene - Calcareous sandstone with carbonaceous claystone and siltstone in al Fayyum area; shale with limestone and sandstone intercalations east of Cairo.	Fe, " Eg. Alab" - Trav, Mn
	Tem	Middle Eocene - Nummulitic limestone and chalk, occasionally with chert in the Cairo- Hilwan divide with variably increasing shale and argillaceous limestone intercalations to its east and west.	Fe, Ba, Och
	Telm	Lower to Middle Eocene - siliceous and dolomitic limestone with minor clay in the middle-latitudes plateau areas in the Eastern and Western Deserts.	
	Tel	Lower Eocene - Limestone with chert bands and concretions, and variable shale content on both sides of the Nile in Upper Egypt, in the south Western Desert and in central Sinai;	Bent
	Tp	Paleocene - Shale and argillaceous limestone, more calcareous at top, widely distributed in the south Western Desert, the Nile Valley, the Red Sea coast and Sinai; Carbonates predominate in the southern most Western Desert and west of al Farafrah Oasis.	
MESOZOIC		CRETACEOUS	
MESOZOIC	rc	Ring complexes (mostly alkaline syenites).	Syenite
MESOZOIC	Kus	Cretaceous (Senonian): includes a) Campanian and Maastrichtian - Silicicastics and carbonates with phosphate beds in the south Western Desert, Nile Valley in Upper Egypt and Red Sea coast; chalk in north Egypt.	P
MESOZOIC		b) Coniacian and Santonian - Carbonate-siliciclastic sequence with zones of oolitic ironstone in Aswan area and Wadi Qina; fossiliferous mudstone in northern part of Egypt.	Fe
MESOZOIC	Kv	Wadi Natash Volcanics - Dominantly alkaline basalt, andesite and trachyte	
MESOZOIC	Kuc	Cenomanian and/or Turonian - Predominantly carbonates in northren Sinai; argillaceous limestone in al Jalalah area; siliciclastics and coquinoid limestone in Wadi Qina; fluviatile siliciclastics in southern Egypt; sandstone in Aswan and east of Lake Nasir area.	Fe, Kaol, WS.
MESOZOIC	Kl	Lower Cretaceous - Sandstone and calcareous sandstone with oolitic ironstone in northern Sinai; Kaolinitic sandstone in central and southern Sinai and west of the Gulf of Suez.	Fe, WS.
MESOZOIC	Kl-j	Lower Cretaceous-Jurassic? - Sandstones and conglomerates, in some areas of southern Egypt.	
MESOZOIC	J	JURASSIC - Alternating fluviatile and marine siliclastics, ironstone, coal seams, and shallow marine carbonates, topped by dense carbonate beds with abundant chert in northern Sinai.	Coal, Fe, Kaol.
MESOZOIC	Tr	TRIASSIC - Clastic-carbonate complex with anhydrite and gypsum intercalations at northeastern Sinai.	
PALEOZOIC	pzu	UPPER PALEOZOIC - Siliciclastics with dolomite and crinoidal limestone, along the northeastern slopes of Northern Jalalah, probably of Permian age. Uppermost unit of red-coloured clastics and thin marine intercalations, in Northern Jalalah, Wadi 'Arabah and central Sinai, probably of Permo -Triassic age.	WS.
PALEOZOIC	Pzc	CARBONIFEROUS - Dolomitic limestone hosting manganese deposits overlain by siliciclastics, occasionally carbonaceous, in central Sinai, siliciclastics and criniudal limestone west of the Gulf of Suez; siliciclastics and chaotic boulders overlain by carbonaceous clastics in Jabal al 'Uwaynat-Abu Ra's area in the south Western Desert	Mn, Cu, U, Coal
PALEOZOIC	Pz	UNDIFFERENTIATED PALEOZOIC (pre- Carboniferous) - siliciclastics, in western and central Sinai, north Eastern Desert, the northeastern slopes of Jabal al 'Uwaynat and in the western foreland at al Jilf al Kabir-Abu Ra's Plateau in the south Western Desert	Cu

Southward advance of the Tethyan shore line

Syrian Arc System

Fig 4: The Metallogenic Symbol



EXAMPLE

6 = Number on the outer circle indicates name of ore locality : Ra's Jimsah

= Line segment on the outer circle indicates the age of the ore: Miocene

= Colour of outer ring indicates geologic class or mode of formation ; Evaporite

= Line segment on the nucleus indicates the type and geological environment

= Colour and shape of the nucleus indicate the metal(s) or mineral content : Sulphur

Only one size of symbols is used,since the exact volume of reserves is not available for most localities

As stated before, and to avoid the high density of data on the map sheets, it was decided to issue the map in two parts, each of four sheets, Part One (Metallic and Non-metallic Ores), and Part Two for Building, Construction Materials and Ornamental Stones. In addition, a ninth sheet presents the legend common to the two sets as well as those specific to each of them.

Well, in the metallogenic symbol, the metal (s) or mineral content is represented by a nucleus of a certain geometric shape and colour. For Part One (Metallic and Non-metallic Ores), the nucleus can take any of 6 geometric shapes and 11colours, so allowing for 66 choices to represent the different deposits (Table 1). On the other hand, in Part Two, two more geometric forms were designed, in addition to the 6 forms used for Part One, while the eleven colours are the same. So, 88 choices are available to represent the ores under consideration (Table 2).

A line on the nucleus indicates the geological enviroment for Part One Sheets (Metallic and Non-metallic Ores) or the rock classification for the sheets of Part Two (Building, Construction Materials and Ornamental Stones). For the geological environment, eight enviroments are identified according to the orientation of the line on the nucleus (Table 3). For the rock classification in the sheets of Part Two, the orientation of the line on the nucleus differentiates 3 types, namely igneous (plutonic, volcanic), sedimentary (non-clastic, clastic) and metamorphic (Table 4).

A coloured ring to the outside of the nucleus indicates the geologic class of the metallic and Non-metallic ores of Part One. Eleven colours are used to differentiate the different genetic classes of deposits (Table 5). Similarly, the same ring, but only in seven colours is used to indicate the mode of formation of the ores of Part Two Sheets (Table 6).

The age of the deposit is given by a line on the outer ring. Eight categories of age, from the Early Proterozoic to the Quaternary are used (Table 7).

Table 1

METALLIC ORES AND NON-METALLIC DEPOSITS

Colour and shape of the nucleus indicate the metal(s) or mineral content

Shapes	○	□	◇	◊	⬭	△
	Cassiterite	Nb - Ta	Tungesten	Be Emerald		
	Iron ore	Bl. Sand	Ti Fe- V	Fe - Magnetite BIF	Phosphorite	Turqoise
	Cu	Mo		Cu-Zn-Pb Ag-Au	Cu-Au	
	Au	Au-Cu				
	Cr	Paridot		Cu-Ni	Asbestos	Talc
		Na	K	Magnesite		
	Lead		Pb-Zn	Pb-Zn-Ag		
			Fluorite	Barite	Celestite	Feldspar
	U			Th		
	Manganese	Corundum	Quartz	Silica-glass	Alum	
	Sulpher	Pyrite		Graphite	Coal	Carb. Shale Oil Shale

Table 2

BUILDING MATERIALS AND ORNAMENTAL STONES

Colour and shape of the nucleus indicate the deposit(s) or mineral content

Shapes	○	□	◇	◊	⬭	△	▽	◯
							Sand and Gravel	Crystalline limestone
	Ochre					Kaolin	Basalt	Serpentinite
						Vermiculite	Limestone	Travertine
			Sandstone			Pumice	Gypsum	Breccia Brocatelli
					Asbestos	Mica	Dolomite	Granite
				Magnesite		Bentonite	Marble	Imp. Porph.
						Diatomite		Egyptian Alabaster
							Diorite	
	Manganese			Clay and Shale	Talc	White sand		Syenite
	Quartzite							Breccia Verdi

Table 3

METALLIC ORES AND NON-METALLIC DEPOSITS

GEOLOGICAL ENVIRONMENT

The geological environment is indicated by a line on the nucleus

I Sedimentary environment

- Sedimentary pile of marginal basins and other marine environments; include stratiform deposits: Celestite, barite, iron, phosphorite, coal, carbonaceous and oil shales, sulphur, copper, manganese, lead, U-Th

- Surficial deposits, essentially unconsolidated materials unconformably overlying other rocks (placers, weathering products, laterites, continental sabkhas): Ochre, natron, black sands (beach placers), alluvial placers (Sn, Au, Feldspar), pumice, and stratabound deposits (manganese, copper, lead-zinc, iron, barite), Silica glass

- Thick metamorphosed sequence, original character not specified: Graphite

II Intrusive igneous environment

- Alkaline rocks: Soda feldspar, rare metals (Nb-Ta)

- Felsic rocks : Molybdenum, tungsten, tin, Au, Au- Cu, U-Th, beryllium, fluorite, potash feldspar, quartz

- Ultramafic-mafic rocks : Titanium iron ore, copper-nickel, peridot

III Volcano-sedimentary associations (Island Arc):

- Intermediate volcanic rocks and associated sediments: Banded iron formation (BIF), polymetallic sulphides (Cu-Pb-Zn), gold, talc

IV Ophiolites

- Serpentinite: Chromite, talc, magnesite, asbestos, vermiculite, emerald, corundum

Table 4

BUILDING MATERIALS AND ORNAMENTAL STONES

ROCK CLASSIFICATION

The rock type is indicated by a line on the nucleus

I IGNEOUS ROCKS

1- Plutonic rocks

- Acidic rocks: granite, syenite, quartz diorite – mica
- Basic rocks: gabbro, diorite
- Ultrabasic rocks: serpentinite – talc, magnesite, asbestos, vermiculite

2- Volcanic rocks

- Basalt, Imperial Porphyry, pumice

II SEDIMENTARY ROCKS

1- Non-clastic:

- Limestone, dolomite, diatomite
- Gypsum, travertine, "Egyptian Alabaster"
- Ochre, manganese (residual)

2- Clastic:

- Gravel, sand, sandstones, clays (including bentonite), glass sand (white sand)
- Breccias

III METAMORPHIC ROCKS

- Marble, quartzite

Table 5

METALLIC ORES AND NON- METALLIC DEPOSITS

GEOLOGIC CLASS

The geologic class of the deposit is shown by the colour of the ring around the nucleus

Mainly concordant deposits in igneous rocks:
Chromite, magnesite, titanium- iron , copper-nickel, peridot, nickel, talc, asbestos

Pegmatite deposits:
Quartz, corundum, feldspar, U-Th

Greisen deposits:
Nb-Ta, tin, U-Th

Veins, shear zones and dykes:
Molybdenum, tungsten, gold, tin, fluorite, emerald, beryl, barite, calcite, base metal sulphides, U-Th, pyrite

Metamorphic deposits:
Graphite

Stratabound deposits:
Lead - zinc, celestite, copper, banded iron formation (BIF), manganese, iron, polymetallic sulphides (Cu, Pb, Zn),barite, U-Th

Chemical, biochemical and organic sediments other than evaporites:
Sulphur, coal, carbonaceous shales, phosphorite

Surficial deposits (Karst):
Laterites, manganese

Placer deposits:
Beach placers (black sands), alluvial placers (Sn, Au, feldspar)

Evaporites:
Gypsum, anhydrite, rock salt, natron, potash salts, alum, U-Th, common salt

Salinas(man-made evaporites):
Common salt, sodium sulphate

Table 6

MODE OF FORMATION

The mode of formation of the building materials and ornamental stones is shown by the colour of the ring around the nucleus

I IGNEOUS

- Intrusive: Granite, syenite, diorite, serpentinite – asbestos, vermiculite, mica, talc, magnesite
- Extrusive: Basalt, pumice, porphyries (Imperial)

II SEDIMENTARY

- Detrital: Sands, sandstones, gravels, clays, white sand (glass sand), breccias (Brocatelli and Verdi)
- Shallow marine, cave and surficial sediments: Limestone, crystalline limestone, dolomite, diatomite, travertine, "Egyptian Alabaster"
- Evaporation: Gypsum and anhydrite
- Lateritization and weathering : Ochre, manganese

III METAMORPHIC

- Marble, quartzite

Table 7

METALLOGENIC AGE

Metallogenic age is indicated by a line on the outer circle

8 - Quaternary
7 - Neogene
6 - Late Mesozoic- Paleogene
5 - Mesozoic
4 - Late Paleozoic - Early Mesozoic
3 - Early Middle Paleozoic
2 - Late Proterozoic
1 - Early Proterozoic

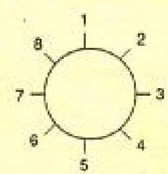


Table 6

MODE OF FORMATION

The mode of formation of the building materials and ornamental stones is shown by the colour of the ring around the nucleus

I IGNEOUS

- Intrusive: Granite, syenite, diorite, serpentinite – asbestos, vermiculite, mica, talc, magnesite
- Extrusive: Basalt, pumice, porphyries (Imperial)

II SEDIMENTARY

- Detrital: Sands, sandstones, gravels, clays, white sand (glass sand), breccias (Brocatelli and Verdi)
- Shallow marine, cave and surficial sediments: Limestone, crystalline limestone, dolomite, diatomite, travertine, "Egyptian Alabaster"
- Evaporation: Gypsum and anhydrite
- Lateritization and weathering : Ochre, manganese

III METAMORPHIC

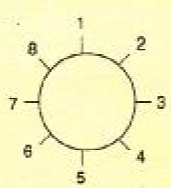
- Marble, quartzite

Table 7

METALLOGENIC AGE

Metallogenic age is indicated by a line on the outer circle

8- Quaternary
7- Neogene
6- Late Mesozoic- Paleogene
5- Mesozoic
4- Late Paleozoic - Early Mesozoic
3- Early Middle Paleozoic
2- Late Proterozoic
1- Early Proterozoic



III- OUTPUT OF THE MAP PROJECT

The Metallogenic Map scale 1:1 million, is produced in 4 sheets covering all the Egyptian terrane (~1 million km^2). Latitude 27° 00 N & Longitude 30° 00' E constitute the border lines between the 4 sheets (Fig.1)---

Owing to density of data, it was decided to issue the map in two parts:
- Part One for Metallic and Non-metallic Ores, and
- Part Two for Building, Construction Materials and Ornamental Stones.

Accordingly, the map is presented in 9 sheets : 4 sheets for Part One, 4 sheets for Part Two and 1 sheet for the legend and explanation of the different symbols introduced into the map.

In addition to the Map Sheets, the Project produced the Mineral Data Bank, four Appendices, and this Explanatory Note, to accompany the sheets.

III-1- THE MINERAL DATA BANK :

Data on the different mineral deposits were collected on data sheet forms, to be filled in by the concerned groups (Groups 4,5,6, and 7). Two different "Data Sheets" were designed, these are:

- Data Sheet for Metallic-Non-metallic deposits hosted in either Basement or Cover rocks. The same was adopted for the Nuclear Materials (Group 7).
- Data Sheet for Building, Construction Materials and Ornamental Stones.

The sheets received from the different groups reached 970 sheets, distributed as follows :

179 Data sheets representing ores in the Basement rocks (submitted by Group 4).
129 Data sheets representing ores hosted in the Phanerozoic sedimentary cover rocks. (submitted by Group 5).
635 Data Sheets representing Building, Construction Materials and Ornamental Stones (submitted by Group 6).
27 Data Sheets for the Nuclear Materials (submitted by Group 7).

The amount of data contained in these sheets are far more than that used to construct and locate the Metallogenic Symbols on the sheets. So, the Committee for Specialized Maps, Council for the Mineral Resources of the Academy on its meeting of 22/7/92 saw the value and benefits of utilizing the available data to establish a Mineral Data Bank for the Mineral Deposits in Egypt, to be used as a reference for any study on the Egyptian ores (metallic, non-metallic, building, construction or ornamental stones).

So, the "Data Base Group" (Group 9), designed a special system for storing the Data using the so-called "Open-File System". Accordingly, 8 files were created, namely:

File 1., with 8 bits of information:
Name of deposit, coordinates, area, nearest town, governorate, mode of occurrence of ore, reserves, references.

File2., contains 8 items :
Size of deposit, shape, angle of inclination, depth, hosting rocks, regional structure, age, recommendations.

File3., contains the chemical analysis data and has the ability to store results of the chemical analysis for 15 compounds, oxides or elements.

File 4., specified for the physical and mechanical characteristics and can hold up to 14 measurements.

File 5., includes listing of the references used by the different contributors.

File 6., concerns the data on the ore reserves and its different categories.

File 7., presents data on the exploration (past and current) of the deposit.

File 8., specified for the exploration works, and shows methods and studies carried out on the deposit with date and the research institution which conducted the exploration study.

The Mineral Data Bank is housed in the Documentation and Information Centre of the Egyptian Geological Survey and Mining Authority. The data are available, free of charge, to all interested.

III-2- APPENDICES :

Four Appendices were generated as part of the Map Project. These are:

1- Appendix 1:
1-1 Alphabetic Index
1-2 Locality Index .
1-3 Geographic Features Index

2- Appendix 2 :
Metallic and Non-metallic deposits
2-1 Alphabetic Index,.
2-2 Locality Index.
2-3 Commodity Index
2-4 Locality Index for the different governorates
2-5 Index Maps for the different commodites.

3- Appendix 3:
Building Materials and Ornamental Stones
3-1 Alphabetic Index
3-2 Locality Index.
3-3 Commodity Index
3-4 Locality Index for different governorates
3-5 Index Maps for different geologic ages
3-6 Index Maps for different building materials

4- Appendix 4:
Bibliography
Commodity Index
Contributors

App. 1 and 3 were deposited in the Egyptian Geological Survey Documentation and Information Centre, under the number 1981, on 1/9/1999.

App. 2 and 4, however, were deposited under the number 10171 on 16/5/2000.

The four appendices are available for users.

Part Two

ORES IN THE SHIELD ROCKS

Maher A. Takla

Since the pioneering works of Hume (1935), the characterization and classification of the basement (Shield) rock of Egypt have been a dynamic and continuous process depending upon the advancement of knowledge and evolution of geological concepts. The Shield rocks of Egypt crop out in the Eastern Desert, Southern Sinai and the southern part of the Western Desert, covering an area of about 100.000 km^2.

In the present map, a simplified tectonostratigraphic classification suitable for the purpose was used, following Takla&Hussein (1995) and adopted. Its main feaures are shown in Table 1.

Table 1: Classification of the Egyptian Shield Rocks (Takla & Hussein, 1995)

IV- Continental margin - within plate magmatism and sedimentation.
- Dykes
- G3 Granites
- G2 Granitoids.
- Younger gabbros
- Clastic molasse sediments (Hammamat clastics)
- Younger volcanics (basaltic andesite-andesite-rhyolite* association).

III- Arc granitoids (G1 granitoids)
- Diorite-tonalite-granodiorite association.

II- Ophiolitic melange and island arc association.
- Metasediments.
- Intermediate to felsic metavolcanics and metapyroclastics.
- Ophiolitic mafic metavolcanics.
- Ophiolitic metagabbros.
- Meta-ultramafites

Thrust contact

1- Gneisses, migmatites, amphibolites and high-grade schists.

The metallic ores in the Shield rocks concentrated mainly in the Central and Southern parts of the Eastern Desert. Ores in association with the Shield rocks of Egypt are classified as shown in Table II (Takla & Hussein, 1995):

CLASSIFICATION OF EGYPTIAN ORES

1 - ORES IN PRECAMBRIAN ROCKS**:

A. Metallic Ores

1- In ophiolitic ultramafics (chromite).
2- In non-ophiolitic mafic-ultramafic intrusions - Younger Gabbros- (Fe-Ti-V & Cu-Ni-Fe sulphides).
3- In island arc metavolcanics (BIF & polymetallic sulphides).
4- In felsic rocks (Nb-Ta-Sn).
5- Vein Type (Sn-W, W, Au-Ag, Mo, U-Th, Pb-Zn, Cu & Mn).

B. Non-Metallic Ores

1- In ophiolitic ultramafics (talc, asbestos, magnesite & vermiculites).
2- Along contacts between ophiolitic ultramafics and metasedimentary melange matrix (graphite).
3- In island arc intermediate-felsic metavolcanics (talc).
4- Albitite, Sinai.
5- Vein Type (beryl, emerald, fluorite, barite, corundum, feldspars, muscovite & quartz).

C. Ornamental Stones

Granites, serpentinites, marbles, Imperial Porphyry andesite, breccia verdi, hornblende gneiss "Cephron Diorite".

2 - ORES IN PHANEROZOIC IGNEOUS ROCKS

1- In Miocene (?) ultramafics (peridot & garnierite, Zabargad Island, Red Sea).
2- In Cretaceous ring complexes (Al "nepheline syenites", Eastern Desert).

* Rhyolite is the post Hammamat felsite, which alternates with the Hammamat sediments.
** Pre-Pan African: association I and Pan-African: associations II, III, IV)

PHANEROZOIC STRATABOUND ORE DEPOSITS

M.M. El-Aref

Hussein and El Sharkawi (1990) reviewed the different genetic classifications of the Egyptian ore deposits including those occurring within the Phanerozoic strata. El Aref (1996) discussed the geological settings and modes of formation of the Phanerozoic deposits and provided a new and integrated genetic scheme. The ore deposits under consideration include varieties of stratabound and stratiform ore types. The development of these deposits coincides well with the paleogeographic evolutional pattern of the Phanerozoic shorelines and the related distribution of paleohighs, as well as paleoclimatic conditions and the sea level cycles which prevailed. The stratiform deposits show conspicuous depositional and diagenetic features and are hosted within certain lithostratigraphic units of shallow near-shore environments of regional or local magnitudes. The stratabound deposits are intimately related to paleoerosion surfaces and comprise an integral part of the related weathering profile. The geological settings of these deposits and their main characteristics and modes of formation are given below. The detailed description of each ore type is included in the related literature (s).

1) PALEOZOIC ORE DEPOSITS

A- Cambrian Stratabound Th-U Conglomerates

This type builds up the basal polymictic conglomerates of the proximal fluvial clastics of the Cambrian Araba Formation, Gabal Nukhul, Um Bogma region, Sinai (Atia, 1996).

B- Cambrian Stratiform Malachite in Shoreface Clastics, Araba Formation, Um Bogma, Sinai:

This type is correlated with the Cambrain cupriferous sediments of Timna, Israel and Wadi Dana, Jordan. The geometry of the malachite, together with the paleotopographic position and environment of the host sediments suggest that Cu was leached from nearby copper bearing Precambrian paleohighs and transported into the basin of deposition as bicarbonate or mobile complexes, and diagenetically recrystalized into malachite during the drying out of the marine host sediments (El Sharkawi et al., 1990a).

C- Carboniferous Stratabound to Stratiform Mn Deposits, Um Bogma Sinai.

The lowermost Early Carboniferous sediments of Um Bogma Formation at Um Bogma hosts stratiform and stratabound Mn ores (El-Sharkawi et al., 1990b). El Aref and Abdel Motelib (1996) recognized the following three general ore facies, which intertongue from east to west:

1) Stratiform continental Mn conglomerates, sandstones and mudstones of fining-upward pattern, representing proximal facies of braided streams, well represented in the extreme eastern part of Um Bogma region, e.g., Gabal Ghorabi, Gabal Sheikh Hebbos and Gabal Adedia.

2- Stratiform lagoonal to swampy intercalated manganiferous mudstone and dolostone, prevailing in the central part of Um Bogma region; and

3- Near-shore pisolitic/oolitic ore of coarsening-upward tendency of relatively high energy (storm-dominated) depositional environment, e.g., Wadi Abu Thor and Gabal Sid El Banat.

Westward, these Mn ore facies change into open marine carbonate facies. Stratabound karst Mn ore and the related paleosol overprint the latter two facies as a result of intra-Carboniferous (intra-Um Bogma) paleokarstification processes. These ore varieties, together with the coeval carbonates, are truncated by the marine shales and dolostones of the overlying upper members of Um Bogma Formation and/or the clastics of the Abu Thora Formation.

The facies distribution of the Mn deposits suggests that Mn and Fe were derived from eastern hinterlands as clasts and suspensions that were deposited in channels along the coastal zone and debauched into the Carboniferous sea depositing lagoon to shallow marine manganiferous ore types. A subsequent phase of uplifting and sea regression accompanied with karstification of the already formed manganiferous dolostones and mudstones led to the leaching and redistribution of the Mn and its concentration in the subsoil horizons of the resulted paleokarst profile. Cu and U bearing phosphate, vanadate, sulphate, halide, silicate and carbonate minerals together with kaolinite, gibbsite and alunite were concentrated in the fossilized lateritic topsoil (organic-rich) horizon of the intra-Carboniferous paleokarst profile.

These deposits are associated with the general southward transgressive trend of the Tethyan Sea and contemporaneous lateritization on the hinterlands (El Aref,1996). They include :

A) Jurassic Coal and Jurassic-Lower Cretaceous Stratiform Ironstones

During the Jurassic-Lower Cretaceous transgressive-regressive cycles on Northern Sinai, the southern hinterlands were under intensive eorsion and deposition of the continental clastics and the associated currently quarried kaolin-rich laterites and paleosols of the Raqaba, Temmariya and Malha Formations in the Southern Sinai and the Gulf of Suez and the equivalent continental clastics of the Gilf Kebir, Six Hill and Sabaya Formations in the southern Western Desert.

Paralic facies associations dominated in the northern part of Egypt. The thickest Jurassic sequence crops out in Northern Sinai at Gabal El Maghara. Its paralic facies associations include coal seams and ironstone bands (El Sharkawi et al., 1989). Albian shallow marine carbonates including oolitic ironstone bands are also exposed in Gabal Manzur, east of Gabal El Maghara. The Jurassic sediments of Gabal El Maghara, North Sinai include the main economic coal seams of Egypt. These seams are confined to the Bathonian sediments and dominated by vitrinite and clarain (Al Far, 1966; Adindani and Shakhov, 1970). Exposed coal deposits are also recorded in Um Bogma district associated with Carboniferous sediments. Subsurface coal seams and coaly sediments have been recorded in some oil wells in the Gulf of Suez region, (Ayun Musa), Sinai and in the Western Desert (Adindani and Shakhov, 1970).

B) Cenomanian Stratiform Ironstone:

The paralic Bahariya Formation cropping out in El Bahariya region, Western Desert, includes within its lower and upper members glauconitic ironstone bands and lenses, 15-150cm thick, well exposed in El Bahariya depression as a result of repeated tectonic pulses of the Upper Cretaceous-Lower Tertiary ("Laramide") tectonic event. Economic Cenomanian ironstone bands of considerable thickness are well represented in El Harra and Nasser mine areas (IEP, 1993-1997).

C) Turonian Stratabound Laterites:

A major regressive phase was established during the Middle Turonian, accompanying an important pulse of the "Laramide" movemment which elevated Southern Egypt, El Bahariya arc and numerous structures across Northern Egypt and Sinai (Said, 1990). The extreme southern hinterlands were subjected to deep weathering processes, including lateritization, and received simultaneous fluvial sedimentation constituting the lower part of the Taref Formation of north Kharga and the Turonian laterite bearing Abu Aggag Formation of northeast Aswan (Germann et al., 1987, Mesaed, 1995 & Sharkawi, et al., 1996). Southwest Aswan at Wadi Kalabsha, the probably concomitant 9m kaolin member of Said and Mansour (1971) and Said et al., (1976) is overlain and underlain by fluvial conglomeratic sandstones similar in composition and texture to those of the Abu Aggag Formation. Eastward of Aswan at Wadi Natash, the upper part of the Abu Aggag Formation intercalates with the Natash volcanic sheets and their lateritic caps.

D) Coniacian-Santonian Stratiform Ironstone:

Southward transgression of shallow Coniacian-Santonian Tethyan Sea extended until Northern Sudan, depositing near-shore sediments along a restricted NS trending basin, i.e the Timsah Formation, at the vicinity of Aswan and the Hawashiya Formation at Central Wadi Qena. Stratiform oolitic ironstone bands are confined to these formations. Meanwhile, genuine marine sediments were deposited in the structural lows of Northern Egypt and the Gulf of Suez area (El Sharkawi, et al., 1996 & El Aref, et al., 1966). The host Timsah Formation of east and southeast Aswan is formed of four large-scale coarsening-upward sedimentary cycles, representing deposition under a repeated shoaling conditions accompanied with acceleration to current and wave activities during a gradual progradation of linear tidal sand/ooid bars on a shelf mud. The oolitic ironstone bands reflect deposition in highly agitated conditions along the bar flanks and bar crests during regressive events terminating short-lived small-scale progradation regimes (IEP, 1993-1997); Meased, 1995; El Sharkawi et al, 1996 & El Aref et al., 1996).

E) Campanian-Maastrichtian Stratiform Phosphorite Deposit:

Economic phosphate strata are confined to the Upper Cretaceous shoreline successions of the Quseir variegated shales or Mut Formation (Campanian) and the Duwi Formation (Campanian-Maastrichtian). These two units comprise the phosphorite Duwi Group of Glenn and Arthur (1990) and are best exposed in a generally E-W trending belt, extendign along the middle latitudes of Egypt. The Duwi Group of strata consist of a relatively sediment-starved heterogeneous mixture deposited in a generally shallow epicontinental sea, during Campanian-Maastrichtian trangressive event, and extended across the northern margin of

the Arabo-Nubian Craton and deepened toward the North. Northward, chalky limestones of open marine condition (the lower part of the Sudr Formation, Sinai and the Khoman B in the Western Desert) were accumulated. The economic phosphate deposits of the Duwi Group are well represented in three main regions; a) Red Sea Coast, including the Quseir Group of mines (i.e. Hamadat, Atshan, Duwi, Anz, Abu Tundub & Hamrawein) and the Safaga Group of mines (i.e. Um El Howeitat, Gasus, Wasif & Mohamed Rabah); b) Nile Valley (i.e. several occurrences located between Easna and Idfu, and c)Abu Tartur plateau, Western Desert. According to Philobbos (1996), The Egyptian Campanian-Maastrichtian phosphorites were deposited in very shallow restricted conditions just off an oyster bank that developed on the highs created by the tilted blocks. The economic phosphorites were deposited on the gentle ramp of the southern tilted block which was bounded from the north by a syn-sedimentary ENE faulting.

3) CENOZOIC ORE DEPOSITS

Two groups of Cenozoic stratabound and stratiform ore deposits can be distinguished, based on their stratigraphic set-up.

A) Paleogene Fe Ore Deposits and Karst-Related Calcareous Deposits "Egyptian Alabaster":

The Paleogene stratabound deposits include:

1) Intra-Eocene stratiform and stratabound Fe deposits

Since Upper Lower Eocene time, a major regressive phase started; the Middle Eocene shoreline was approximately along the south Minia-El Bahariya latitude. This northward retreat of the Tethyan paleoshoreline was accompanied by the culmination of the Syrian arc tectonic event which led to the uplifting of the Cretaceous strata in El Bahariya region. Intra-Eocene stratiform and stratabound ironstones were developed along the Middle Eocene palecoshoreline on Cretaceous paleohighs and are represented by the following successive ore types (Khalil, 1995; El Aref, 1996; IEP, 1993-1997 & El Aref, et al., 1999).

a) Stratabound iron and manganese rich laterite hosting kaolinite and alunite nodules, developed along the Cretaceous-Eocene boundary in El Harra and El Gedida mine areas.

b) Middle Eocene (Lutetian) stratiform oolitic-pisolitic (oncolitic) ironstone representing deposition during shallowing regimes along Lutetian paleoshoreline. This ore type constitutes the lowermost part of the iron ore sequence of El Harra and El Gedida mine areas and is related to shallow marine deposition on Cretaceous paleohighs.

c) Middle Eocene stratiform ferruginous mudstones and dolostones of restricted lagoonal conditions comprising the upper portion of the Lutetian sequence (i.e. Naqb & Qazzun Formations).

d) Lutetian-Bartonian stratabound karst ore resulting from paleokarsttification of type c during Lutetian-Bartonian uplifting phase, sea-level fall and deep weathering processes (El Aref & Lotfy, 1989, El Aref et al., 1999).

e) Stratiform channel-fill ore conglomerates truncating the karst ore and debauching into Bartonian sea (El Gedida mine).

f) Bartonian iron laterite developed during the intermittent lateritization of Bartonian glauconitic sequences (El Gedida mine, El Sharkawi & Khalil, 1977).

2- Upper Cretaceous-post-Eocene Fe-rich lateritic blankets (surficial ferricrete duricrusts):

These deposits were generated during the morphologic evolution of El Bahariya depression, Western Desert. The most promising ferricrete type is high-lying, forming an indurated and dissected surficial crusts (9-16m thick) of constant altitude (270-320m, above sea level), capping the beveled summits of isolated conehils, inselbergs and flat-topped mesas. Such topographically high crusts denote remnants of an old continuous erosion surface or peneplain (El Aref et al., 1991) and delineate the level of paleo watertable. These lateritic blankets represent the products of in situ deep weathering processes (involving karstification). These processes acted upon the exposed Cenomanian clastics and the related ironstones of the southern part of El Bahariya depression (e.g. El Heiz area, Gabal Radwan and Sandstone Hill, (El Aref et al., 1991) and the Middle Eocene Fe-bearing carbonates (Naqb & Qazzun Formations) of the northwestern corner of the depression (e.g. Gabal Ghorabi, El Aref & Lotfy, 1989).

3- Fossil pre-rift (Oligocene?) alumino-ferruginous latosol, Um Gereifat area, Red Sea coastal zone:

This latosol profile comprises three transitional horizons (El Aref, 1993a) :a) basal slightly weathered Precambrian granite, b) a middle saprolite horizon, and c) an upper Al an Al and Fe-rich laterite horizon. The uppermost laterite horizon is truncated by the proto-rift fanglomerates of the Late Oligocene-Early Miocene? Ranga Formation.

4- Karst calcareous deposits ("Egyptian Alabaster"):

This deposit type represents the karst-related reprecipitated calcium carbonates and the associated terra-rossa soil (i.e., calcareous cave and surficial sediments) which are known in the Egyptian literature as "Egyptian Alabaster' or travertine.

Paleokarstifications of multi-erosion cycles have had significant effects upon the landscape development of the Cretaceous and Eocene carbonates cropping out south of the Upper Eocene-Oligocene paleo-shorelines and on the development of the related calcareous deposits (Abu Khadra et al., 1987; El Aref et al., 1987; Philip et al.,; El Aref et al., 1996).

B) Neogene Rift-Related Ore Deposits, Red Sea Coastal Zone:

The Neogene deposition under the Red Sea rifting dynamics resulted in a series of mixed clastic, carbonate and evaporite facies associations exhibiting variable stratigraphic set-up and lateral distributions (e.g. Montenat et al., 1988; El Aref, 1993b). Numerous small-scale economic and non-economic, stratabound and stratiform Ba and Sr sulphates, Pb, Zn and Fe sulphides, S and Mn oxide and hydroxide are intimately related to some of the syn-rift depositional environments and syn-rift paleokarst surface. These include :

1- Stratiform to stratabound galena in the beach sandstones of the basal part of the Middle Miocene Um Mahara Formation, cropping out in Essel and Zug El Bohar mine areas (El Aref and Amstutz, 1983).

2- Stratiform (layered) oolitic/oncolitic Mn ore, up to 80 cm thick, conformable with the upper lagoonal algal limestones of the Um Mahara Formation and cropping out in Gabal Abu Shaar El Qibli (El Aref And Abdel Moteleb, 1992).

3- Stratiform celestite of rhythmic crystallization texture confined to restricted supratidal evaporitic limestones which consitiute the upper part of the Middle Miocene Um Mahara Formation at Wadi Essel (El Aref, 1993b).

4- Stratabound intra-karstic celestite (celestite stalagmites and stalactites) related to the paleokarstification of the type 3 and its host rocks during the post-Um Mahara pre-Abu Dabbab paleokarst event (El Aref, 1993b)

5- Stratiform barite layers or laminae confined to restricted sabkha facies of the Middle-Late Miocene Abu Dabbab Evaporite (Abdel Wahab and Ahmed, 1987).

6- Stratiform and stratabound biogenic sulfur deposits associated with bituminous materials and/or surface oil seepage. Sulfur is confined to sabkha stromatolitic carbonates and evaporites of the Abu Dabbab Formation (e.g. Ranga and Um Rheiga occurrences, El Aref, 1984; Abdel Wahab and Ahmed, 1987) or the coeval Gemsa Formation (e.g. Ras Gemsa, Gabal El Zeit occurrences, Shukri and Nakhla, 1955; Wali et al., 1989 and Youssef, 1989).

7- Stratabound karstic barite confined to karst features scattered within the Abu Dabbab evaporite sequence (e.g. Gabal Abu Ghorban, El Aref and Ahmed, 1986).

8- Stratabound Pb, Zn and Fe sulfides with varieties of Pb&Zn sulphates, carbonates, chlorides, phosphates, molybdates and silicates as well as Fe-oxides and hydroxides, silica; Ca,Mg, and Fe carbonates, gypsum, anhydrite and kaolinite (e.g.Um Gheig mine area). This mineral assemblage is hosted in a karst fill mass developed along a major NW-SE rift fault as a response of Plio-Pleistocene (post-Um Gheig) paleokarst event (El Aref and Amstutz, 1983; El Aref et al., 1986; El Aref 1993a,b).

9- Surficial manganese and barite deposits, long extracted from Halaib-Elba region, are described in detail by El Shazly (1975), El Shazly and Saleeb Roufaiel (1959) and Basta and Saleeb (1971). They exhibit features and textures of supergene processes that acted upon Precambrian granites and Miocene rocks and most likely related to the Plio-Pleistocene weathering event.

C) Quaternary Placer Deposits :

Quaternary placer deposits were formed by the mechanical concentration of resistant minerals and include beach and alluvial deposits.

Beach placers are represented by the black sand deposits along the Miditerranean beach infront of the Nile Delta, and infront of some wadis along the Red Sea Coast. The main heavy minerals present include ilmenite, magnetite, garnet, zircon, monazite, rutile, cassiterite, gold and heavy silicates.

On the other hand, alluvial placers are reported from many wadis, especially the upper reaches of Wadi Allaqi. The essential heavy minerals included are gold, cassiterite, wolframite, beryl, zircon among other less important ones.

Part Four

URANIUM DEPOSITS IN EGYPT

Abdalla A. Abdel Monem

The uranium deposits of the world are classified according to their geologic setting. The International Atomic Energy Agency (IAEA) developed in (1988/1989) a working classification comprising 15 different types of deposits.

The uranium deposits discovered in Egypt so far can be grouped under the following types:

1- Vein Type Deposits :

The vein deposits of uranium are those in which uranium minerals fill and/or encrust cavities such as cracks, fissures, pore spaces, breccias and stock-works, the dimensions of the openings have a wide range. The Egyptian uranium deposits that can be classified under this type are the following :

– Jabal Al Qattar	(E9-2)
– Al Missikat-Al Aradiyah	(E9-13)
– Al Atshan-Wadi Karim	(G9-18)
– Al Bakriyah	(G9-12)
– Abu Jaradi	(G10-5)
– Jabal Al Atawi	(10-12)
– Umm Huyut	(G10-12)

2-Intrusive Type Deposits :

This type of uranium deposits comprises those deposits associated with intrusive granitoid rocks of different chemical composition (alaskite, granite, monzonite, peralkaline syenite, carbonatite and pegmatite). The Egyptian uranium deposits that can be grouped under this type are the following :

– Jabal Darah	(E8-2)
– Nisab Al Bujum	(15-1)

3- Metasomatic Type Deposits:

This group includes those deposits in alkali metasomatites commonly intruded by microcline granites such as albitites, aegirine and alkali amophibole rocks. The Egyptian uranium deposits that can be classified under this type are the following :

– Wadi Abu Rushayyid	(H10-15)
– Umm Ara-Umm Shilman	(J9-5)

4- Sandstone Type Deposits:

This group of uranium deposits includes deposits in sandstone host rocks ranging in age from Carboniferous to Tertiary and occur on every continent outside the polar regions. The tectonic environments include platform and intracratonic, intermountane, graben and regional extensional volcanogenic and continental margin basins. The sedimentary environments comprise continental, marginal marine and marine ones. The continental enviroumeuts include fluvial, lacustrine, eolian and volcanogenic systems. The marginal marine environments include fluvial coastal plains and shear zones and lacustrine to binary lagoon systems. The marine environment is the shallow sea system.

The timing and geochemical character of the mineralizing process were closely related to the diagenesis of the host rocks. In most cases the meteoric waters as part of the sedimentational and subsequent burial processes or as later introduction from exposed basin margins are the mineralizing solutions.

Hydrologic continuity between the source of uranium and eventual host rock always existed.

The Egyptian uranium deposits that can be classified under this type are the following :

- Jabal Al Hufhuf (D4-2)
- Jabal Qatrani (C6-2)
- Wadi Arabah (C8-1)
- Wadi Allougah (C9-2)
- Wadi As Sahow (D9-4)

5-Surficial Type Deposits :

The uranium surficial depopsits may be broadly defined as uraniferous sediments usually of Tertiary to Recent age which have not been subjected to deep burial and may or may not have been calcified to some degree. The uranium deposits associated with calcrete, which occur in semi-arid regions where movements is chiefly subterranean are included in this type. Additional environments for uranium deposition include peat and bog, karst caverns and pedogenic and structural fills. The Egyptian deposits that can be grouped under this type are the following :

- Lake Sitrah (D2-1)
- Wadi Allougah (C9-2)

6- Phosphorite Type Deposits:

Sedimentary phosphorites maintain low concentrations of uranium in fine grained apatite. They are considered by (LAFA) as an unconventional resource of uranium which is recovered as a by-product during the manufacturing of phosphoric acid.

7- Other Type Deposits:

The Black Sand placers at Rosetta (A6-3), Damietta (A7-4) and West Al Arish (A9-2), contain very low concentrations of the mineral monazite from which U and Th are recorded along with main rare earth elements.

Part Five

BUILDING, CONSTRUCTION MATERIALS & ORNAMENTAL STONES

Bakr A. El Naasan

Building materials are natural rock materials used as mined or processed mechanically to various architectural and decorative items.

Although these building materials are out of the scope of the metallogenic map, yet they are of utmost importance for construction and rehabilitation. Therefore a decision was taken to publish a special issue of the metallogenic map devoted to the building materials to show their spatial distribution, accompanied by the available data about their physical, chemical and mechanical properties and their amenability to working.

The map will help in evaluating the building materials of each governorate and the proper exploitation of these natural resources. Furthermore, it will help in planning for further exploratory work for building material and the investigation of their properties.

For the purpose of preparing the map, the building materials were grouped under the following categories :

1- Dimension or decorative stones.
2- Cut-Stones
3- Crushed Stones
4- Ceramic Materials
5- Mineral Binders
6- Concretes
7- Building Mortars
8- Heat and Acoustic Insulating Materials
9- Paints

1- Dimension Stones:

These stones, include facing slabs, are usually of :

– Granite, syenite, diorite and granodiorite.
– Inperial Porphyries and basalt
– Marble, breccia (brocatelli), conglomerate (Verde antiques) and serpentinites.
– Limestone, alabaster, travertine and sandstone.

2- Cut Stones :

These stones are manufactured from limestone, sandstone, granites, diorites and basalts.

3- Crushed Stones :

Crushed stones are mixtures of stone fragments, 5-70mm, obtained by crushing various rocks.

4- Ceramic Materials :

Ceramic materials range in composition from common brick clay to kaolin. Ceramic materials may be given desired properties by means of various additions such as; quartz sand, chalk, dolomite and ground marl. Oxides of some metals may be used to give white clays the desired colour.

Light-weight building bricks are formed of diatomite with admixture of clays.

5- Mineral Binders :

These mineral binders are suitable for the preparation of motars and concretes. These binders fall into two main groups:

a- Air setting binding materials, and these are formed of gypsum, anhydrite, magnesite or lime.

b- Hydraulic binding materials, and these include Portland cement which contains limestones and clayey substances. Setting time is controlled by adding gypsum. Portland cement may carry other oxides as Fe_2O_3, MgO and alkali oxides. White Portland cement is manufactured from raw materials with minimum colouring oxides. The source materials are pure limestone, marble and white kaolin clays.

Coloured Portland cement, however, is made by combining white cement clinker with mineral paints as ochre.

6- Concretes :

Concretes are formed of mixtures of binding materials and aggregate formed of sand and crushed stone or gravel.

Sand may be natural or formed by crushing unweathered igneous, metamorphic or carbonate rocks.

Gravel may also be natural or formed of crushed stone. Coloured concretes are obtained by adding mineral pigments as ochre to the mixture or using

aggregates possessing the required colour as red quartzite, marble or other coloured rocks.

Light-weight concrete is formed of natural porous material obtained by crushing light-weight rocks such as pumice, porous limestone or tufas.

7- Building Mortars :

Building mortar is a mixture consisting of binding material with sand.

According to the binding material used, mortars are subdivided into : cement mortar, lime mortar or gypsum mortar. Aggregates for coloured ornamental mortars are quartz sand and sand obtained by crushing granite, marble, dolomite, lime and other white or coloured rocks.

The finished product can be given lustre by adding mica. Plasters are coloured by natural pigments as ochre.

8- Heat and Sound Insulating Materials :

Heat and sound insulating materials are formed of asbestos, caustic dolomite, caustic magnesite, diatomite, vermiculite, pumice and other porous rocks, used as crushed aggregates.

9- Paints:

Paints are classified into pigments and fillers.

Pigments are coloured, finely ground mineral material, insoluble or poorly so in water and organic solvents. Natural mineral pigments are mined in finished state, concentrated and ground to powder. The group of mineral pigments includes; natural white chalk, yellow ochre, brown red iron oxides (Fe_2O_3, FeO), grey graphite, green glauconite and black manganese oxides.

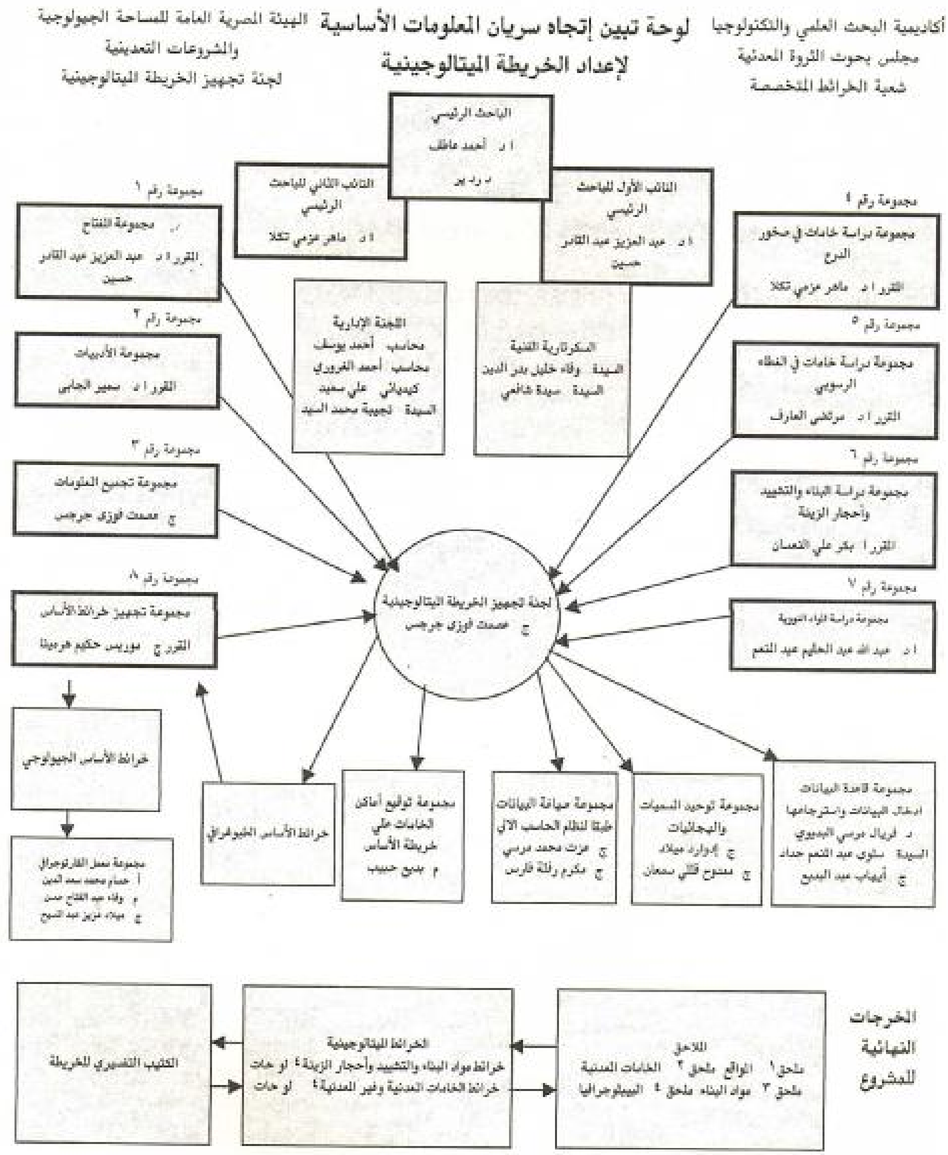
Fillers are mostly white and give particular properties to paints. These fillers are; kaolin, talc, sand, quartz dust and asbestos dust.

The aforementioned building materials are shown on the map as listed herewith:

List Of Building Materials Shown On The Map

Material	Governorate
Alabaster	Al Minya, Asyut, Bani Suwayf, S. Sinai, Suez.
Asbestos	Red Sea.
Basalt	Al Jizah, Al Minya, Al Qalyubiyah, Al Wadi Al Jadid, Cairo, Red Sea, S. Sinai
Bentonite	Al Fayyum, Al Jizah, Cairo, Matruh, S. Sinai.
Breccia Brocatelli	Asyut, Suhaj,
Breccia Verdi	Qina
Clay	Al Buhayrah, Al Fayyum, Al Ismailiyah, Al Jizah, Al Minya, Al Wadi Al Jadid, Aswan, Asyut, Bani Suwayf, Cairo, Matruh, N. Sinai, Qina, Red Sea, S. Sinai, Suez, Suhaj.
Clay (Kaolin)	Al Wadi Al Jadid, Aswan, S. Sinai.
Diatomite	Al Fayyum
Diorite & Grano-diorite	Al Wadi Al Jadid, Aswan, Bani Suwayf, Red Sea, S. Sinai.
Dolomite	Al Fayyum, Al Jizah, N. Sinai, Red Sea, S. Sinai, Suez.
Glass Sands	Al Fayyum, Cairo, N. Sinai, S. Sinai, Suez.
Granite	Al Minya, Aswan, Red Sea, S. Sinai.
Gypsum	Al Fayyum, Al Ismailiyah, Al Jizah, Alexandria, Matruh, N. Sinai, Red Sea, S. Sinai, Suez.
Imperial Porphyry	Red Sea.
Iron Ochre	Al Jizah, Al Wadi Al Jadid, Red Sea.
Limestone	Al Fayyum, Al Ismailiyah, Al Jizah, Al Minya, Al Qalyubiyah, Al Wadi Al Jadid, Alexandria, Al Sharqiyah, Aswan, Asyut, Bani Suwayf, Cairo, Matruh, N. Sinai, Qina, Red Sea, S. Sinai, Suez, Suhaj.
Limestone (crystalline)	Al Minya, Al Wadi Al Jadid, S. Sinai, Suez.

Magnesite	Red Sea.
Manganese	Red Sea, S. Sinai, Suez.
Marble	Al Jizah, Al Minya, Al Wadi Al Jadid, Aswan, N. Sinai, Red Sea.
Mica	Red Sea.
Pumice	Alexandria.
Quartzite	Aswan, Red Sea.
Sand	Al Buhayrah, Al Jizah, Al Sharqiyah, Cairo Suez.
Sand & Gravel	Al Buhayrah, Al Fayyum, Al Ismailiyah, Al Jizah, Al Menofiyah, Al Sharqiyah, Bani Suwayf, Cairo, Red Sea, Suez.
Sandstone	Aswan, Red Sea, S. Sinai.
Serpentinite	Red Sea.
Shale	Al Wadi Al Jadid, Aswan, Qina, Red Sea.
Syenite	Red Sea.
Talc	Aswan, Red Sea.
Travertine	Suhaj.
Vermiculite	Red Sea.



بالثروات المعدنية للإستفادة من المناقشات العلمية التي تتم في مثل هذا الإجتماع.

وفي ١٩٩٨/٣/٧م عُقد إجتماع عمل مُوسع حضرته اللجنة الإستشارية، ولجنة التقييم، ورئيس هيئة المساحة الچيولوچية، وأعضاء شعبة الخرائط المتخصصة، وبحضور السيد الاستاذ الدكتور/ يسري محمد مرسي، رئيس أكاديمية البحث العلمي والتكنولوچيا حيث تم استعراض ما تم إنجازه من أعمال حتي هذا التاريخ.

شكر وتقدير

وختاماً، يقدم رئيس الفريق البحثي خالص الشكر والتقدير إلي جميع السادة الأفاضل رؤساء هيئة المساحة الچيولوچية، وأكاديمية البحث العلمي والتكنولوچيا علي المعاونة الصادقة في إخراج هذا العمل الكبير، والي السادة أعضاء الفريق البحثي، وأعضاء الفريق المعاون، ،وكذا رؤساء وأعضاء مجموعات العمل الذين شاركوا في تحقيق هذا الإنجاز الكبير.

ولا يفوتنا أن نقدم الشكر إلي السادة أعضاء اللجنة الإستشارية، ولجنة التقييم فقد كان لتوجيهاتهما أبلغ الأثر في إنجاز هذا العمل بالشكل الذى أخرج به.

أما الجهد الذي بذلته الأجهزة الإدارية والمالية بأكاديمية البحث العلمي وهيئة المساحة الچيولوچية واللجنة الإدارية للمشروع فإنه يستحق كل الشكر والتقدير.

والله الموفق..

أ.د./ أحمد عاطف دردير
رئيس الفريق البحثي
لمشروع الخريطة الميتالوچينية

بالثروات المعدنية للإستفادة من المناقشات العلمية التي تتم في مثل هذا الإجتماع.

وفي ١٩٩٨/٣/٧م عُقد إجتماع عمل مُوسع حضرته اللجنة الإستشارية، ولجنة التقييم، ورئيس هيئة المساحة الچيولوچية، وأعضاء شعبة الخرائط المتخصصة، وبحضور السيد الاستاذ الدكتور/ يسري محمد مرسي، رئيس أكاديمية البحث العلمي والتكنولوچيا حيث تم استعراض ما تم إنجازه من أعمال حتي هذا التاريخ.

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ولا يفوتنا أن نقدم الشكر إلي السادة أعضاء اللجنة الإستشارية، ولجنة التقييم فقد كان لتوجيهاتهما أبلغ الأثر في إنجاز هذا العمل بالشكل الذى أخرج به.

أما الجهد الذي بذلته الأجهزة الإدارية والمالية بأكاديمية البحث العلمي وهيئة المساحة الچيولوچية واللجنة الادارية للمشروع فإنه يستحق كل الشكر والتقدير.

والله الموفق..

أ.د./ أحمد عاطف دردير
رئيس الفريق البحثي
لمشروع الخريطة الميتالوچينية

١٢

وتختص هذه اللجنة بمراجعة وإقرار قبول التقارير المرحلية ومتابعة سير العمل علي فترات متقاربة وتقديم النصح والتوجيه بصفة مستمرة لرئيس الفريق البحثي، وقد تم تقديم ثمان تقارير مرحلية أولها تم تقديمه وإجازاته عام ١٩٩٢ وأخرها تم تقديمه واجازاته عام ١٩٩٦ واعتمدت الأكاديمية هذه التقارير كل في حينه.

وقد حتمت كثافة المعلومات والبيانات العلمية التي تم جمعها إصدار الخريطة الميتالوچينية في جزئين يشمل كل جزء أربعة لوحات، الأول: منها خاص بالخامات الفلزية واللافلزية، الثاني: خاص بمواد البناء والتشييد وأحجار الزينة، بالإضافة إلي لوحة تاسعة خصصت لشرح الدليل المبسط للأساس الچيولوچي والدليل العام للخريطة الميتالوچينية.

إستخدام نظام الأمم المتحدة في ترجمة المسميات العربية:

نظراً لصدور الخريطة باللغة الانجليزية، فقد إتفق علي استخدام قواعد نظام الترجمة الواردة بالخرائط السابقة، وسجلات هيئة المساحة المصرية، وأكاديمية البحث العلمي، وهيئة المساحة الچيولوچية في توافق مع الترجمة الحرفية للمسميات العربية الذي قام بوضعه المتخصصون العرب بهيئة الأمم المتحدة بغرض ترجمة مسميات الأماكن العربية المنطوقة نطقاً نحوياً رسمياً وليست المنطوقة نطقاً عامياً غير رسمي. وتقوم تلك القواعد علي أساس إستخدام حروف ابجدية لاتينية (إنجليزية) محددة سواء ساكنة أو متحركة أو حروف مزدوجة وعلامات صوتية خاصة لتقابل ما يناظرها من الأبجدية العربية.

ولهذا أصبح من الممكن أن تترجم الكلمات العربية إلي الحروف اللاتينية وأن تعاد ترجمتها إلي الأبجدية العربية الساكنة والمتحركة بكل دقة واحكام دون أن يتغير منطوقها أو معناها.

المخرجات النهائية للمشروع:

بالإضافة إلي اللوحات الثمان ولوحة المفتاح، تضمنت مخرجات الخريطة ما يلي:

أولاً: قاعدة البيانات:

توجد قاعدة بيانات كاملة عن الخامات والثروات المعدنية المعروفة والمكتشفة في مصر حتي عام ١٩٩٥م، متاحة للإستخدام بمركز معلومات هيئة المساحة الچيولوچية.

ثانياً: ملاحق الخريطة:

قام الفريق البحثي بتجهيز أربعة ملاحق خاصة بالمعلومات علي الخريطة، وبياناتها كالآتي:

- كتالوج الأسماء الجغرافية.
- كتالوج مواقع الخامات الفلزية وغير الفلزية.
- كتالوج أسماء مواقع مواد البناء والتشييد وأحجار الزينة.
- سجل ببيليوجرافي بالأبحاث المنشورة وغير المنشورة عن الخامات المصرية.

وهذه الكتالوجات والسجلات محفوظة بمركز معلومات هيئة المساحة الچيولوچية ومكتبة أكاديمية البحث العلمي والتكنولوچيا كوثائق إعداد الخريطة الميتالوچينية.

وتمت طباعة ألفيّ (٢٠٠٠) نسخة من الخريطة وإيداعها بمركز معلومات هيئة المساحة الچيولوچية بعد تسليم حصة منها إلي الأكاديمية، ثم وزعت نسخ كاملة علي أعضاء المشروع وأعضاء شعبة الخرائط المتخصصة والأساتذة والعلماء المسجلين علي قائمة التبادل والتوزيع بهيئة المساحة الچيولوچية والتبادل الخارجي، علاوة علي أن هذه الخريطة متاحة للبيع في كل من هيئة المساحة الچيولوچية وأكاديمية البحث العلمي والتكنولوچيا.

الموقف الإعلامي:

قام المشروع بعقد ندوتين (ملتقي علمي) بتاريخ ١٩٩٤/٦/٢٢م و ١٩٩٤/١٢/١٥م وذلك بغرض الإعلام عما تم إنجازه من الخريطة الميتالوچينية، وشهد كل ندوة عدد كبير من المتخصصين والمهتمين

وترجع ضرورة إصدار الخريطة الميتالوچينية إلي أهمية إستخدامها في التخطيط السليم للسياسة العامة للتعدين وإستخدامات الأراضي علي مستوي الجمهورية كذلك مساعدة الشركات العاملة في مجال التعدين لتحقيق أهدافها مما يؤدي إلي الوفر في الإنفاق علي عمليات البحث والاستكشاف.

هذا- وبالإضافة، يعتبر إعداد ونشر هذه الخريطة (والتي تمثل أول خريطة من نوعها في المنطقة) مسايرة للتقدم العلمي والتكنولوچي العالمي، كما تشكل الخريطة الميتالوچينية إحدي الراقات (Layers) بالغة الأهمية في خرائط الإستخدام الأمثل للأرض Land use maps.

تشكيل الفريق البحثي للمشروع:

نظراً لضخامة العمل المطلوب وتنوعه، تم تشكيل ثمان مجموعات عمل متخصصة تضم كل منها عدداً من العلماء المتخصصين في مجال العمل المكلفة به المجموعة. هذا بالإضافة إلي لجنة لتجهيز الخريطة تختص بالتنسيق بين مجموعات العمل المختلفة. وفيما يلي بيان هذه المجموعات:

١- مجموعة إعداد مفتاح الخريطة : ومقررها أ.د/ عبد العزيز عبد القادر حسين- هيئة المساحة الجيولوچية والمشروعات التعدينية، وتضم عشرة علماء متخصصين.

٢- مجموعة تجميع الأعمال المنشورة وغير المنشورة؛ ومقررها أ.د/ سمير الجابي - جامعة أسيوط، والمقرر المناوب د/ فريال مرسي البديوي - هيئة المساحة الچيولوچية، ويتعاون معهما عشرون من العلماء والباحثين.

٣- مجموعة حصر الخامات والمواد المعدنية؛ ومقررها ج/ عصمت فوزي جرجس – هيئة المساحة الچيولوچية.

٤- مجموعة دراسة الخامات المعدنية بصخور القاعدة، ومقررها أ.د./ ماهر عزمي تكلا- جامعة القاهرة، وبها عشرون من أساتذة الجامعات والباحثين.

٥- مجموعة دراسات الخامات بالغطاء الرسوبي؛ ومقررها أ.د. مرتضي مراد طه العارف - جامعة القاهرة. ويشارك بالعمل عشرة من العلماء المتخصصين.

٦- مجموعة دراسة مواد البناء والتشييد وأحجار الزينة؛ ومقررها ج/بكر علي النعسان -خبير چيولوچي - يشاركه عشرون من المتخصصين.

٧- مجموعة دراسة المواد النووية؛ ومقررها أ.د / عبد الله عبد الحليم عبد المنعم هيئة المواد النووية. وتضم المجموعة خمسة عشر عالماً متخصصاً.

٨-مجموعة تجهيز الخرائط الچيولوچية؛ ومقررها ج./ موريس هرمينا- خبير چيولوچي. ويشاركه عشرة من المختصين المتميزين.

٩- مجموعة قاعدة البيانات؛ ومقررتها د. فريال مرسي البديوي- هيئة المساحة الچيولوچية. ويسهم معها عشرون متخصصاً.

ونظراً للأهمية القومية لهذا المشروع واتساع أوجه البحث تشكلت لجنة إستشارية من علماء متخصصين أسهموا كثيراً في مجال الچيولوچيا والخامات تكون مرجعاً للسادة الباحثين من مجموعات العمل المختلفة للإستفادة بخبراتهم والإستماع إلي آرائهم لحل أي مشكلات علمية قد تظهر أثناء العمل بالمشروع وضمت هذه اللجنة الإستشارية كلاً من:

أ.د. سمير الحابي، أ.د. عماد رمزي فلبوس، أ.ج. جابر محمود نعيم، أ.ج. محمد سميح عافية، أ.ج. محمد الحناوي، وكان المستشار المالي والإداري الإستاذ المحاسب/ أحمد ماهر الغروري.

كما شكلت الأكاديمية (مجلس بحوث الثروة المغدنية) لجنة للمتابعة والتقييم ضمت ثلاثة من أكبر علماء مصر المتخصصين والمشهود لهم في مجالات الچيولوچيا المختلفة هم :

أ.د. محمد كمال العقاد، أ.د. مراد إبراهيم يوسف، أ.ج/ محمود فوزي الرملي

بسم الله الرحمن الرحيم

الخريطة الميتالوجينية لمصر
مقياس ١ : مليون

تقديم وتعريف

أ.د. أحمد عاطف دردير - رئيس الفريق البحثي

بدأ العمل لتنفيذ المشروع القومي للخريطة الميتالوجينية - مقياس ١ : مليون - في ١٩٩٠/٦/٣٠م بعد موافقة أكاديمية البحث العلمي والتكنولوجيا علي إسناد تنفيذ هذه الخريطة من مجلس بحوث الثروة المعدنية بالأكاديمية إلي هيئة المساحة الجيولوجية لتنفيذها ضمن مشروعات الخطة الخمسية ٨٧-١٩٩٢م بتمويل مشترك بين الأكاديمية (مقداره ١ مليون جنيه نقداً) وهيئة المساحة الجيولوجية (٣ مليون جنيه عيناً). وعلي أثر ذلك تم تشكيل الفريق البحثي من باحثين ومتخصصين من معظم الجامعات والمراكز البحثية في مصر، بالإضافة إلي خبراء هيئة المساحة الجيولوجية.

وصدرت الخريطة في ثمان لوحات، ولوحة تفسيرية وأربعة ملاحق وهذا الكتيب التفسيري، بعد جمع ومعالجة وتقييم وتوقيع أحدث المعلومات والبيانات عن الخامات المعدنية التي جمعت خلال الفترة ١٩٩٠ - ١٩٩٥م.

وقع علي هذه الخريطة ٧٠٠ راسب أختيرت من بين ٩٠٠ راسب ومؤشر تم إختيارها علي أساس الأهمية الإقتصادية للراسب وإمكانية إظهاره بالمقياس المعتمد.

وأسفر إنجاز هذا العمل عن كم غزير من المعلومات المتكاملة عن الرواسب والمواقع المعدنية في مصر أمكن جمعها وتخزينها في قاعدة بيانات تُشكل حالياً بنكاً للمعلومات عن الثروات المعدنية المصرية، يتيح لهيئة المساحة الجيولوجية والمشروعات التعدينية (مقر قاعدة البيانات) تحديث هذه البيانات بإستمرار لإستخدامها كمرجع عند إعداد الدراسات والمشروعات في هذا المجال.

وترجع ضرورة إصدار الخريطة الميتالوجينية إلي أهمية إستخدامها في التخطيط السليم للسياسة العامة للتعدين وإستخدامات الأراضي علي مستوي الجمهورية كذلك مساعدة الشركات العاملة في مجال التعدين لتحقيق أهدافها مما يؤدي إلي الوفر في الإنفاق علي عمليات البحث والإستكشاف.

هذا- وبالإضافة، يعتبر إعداد ونشر هذه الخريطة (والتي تمثل أول خريطة من نوعها في المنطقة) مسايرة للتقدم العلمي والتكنولوجي العالمي، كما تشكل الخريطة الميتالوجينية إحدي الراقات (Layers) بالغة الأهمية في خرائط الإستخدام الأمثل للأرض Land use maps.

تشكيل الفريق البحثي للمشروع:

نظراً لضخامة العمل المطلوب وتنوعه، تم تشكيل ثمان مجموعات عمل متخصصة تضم كل منها عدداً من العلماء المتخصصين في مجال العمل المكلفة به المجموعة. هذا بالإضافة إلي لجنة لتجهيز الخريطة تختص بالتنسيق بين مجموعات العمل المختلفة. وفيما يلي بيان هذه المجموعات:

١- مجموعة إعداد مفتاح الخريطة ، ومقررها أ.د/ عبد العزيز عبد القادر حسين- هيئة المساحة الجيولوجية والمشروعات التعدينية، وتضم عشرة علماء متخصصين.

٢- مجموعة تجميع الأعمال المنشورة وغير المنشورة، ومقررها أ.د/ سمير الجابي - جامعة أسيوط، والمقرر المناوب د/ فريال مرسي البديوي - هيئة المساحة الجيولوجية، ويتعاون معهما عشرون من العلماء والباحثين.

٣- مجموعة حصر الخامات والمواد المعدنية، ومقررها ج/ عصمت فوزي جرجس - هيئة المساحة الجيولوجية.

٤- مجموعة دراسة الخامات المعدنية بصخور القاعدة، ومقررها أ.د./ ماهر عزمي تكلا- جامعة القاهرة، وبها عشرون من أساتذة الجامعات والباحثين.

هذا وقد تحقق من خلال إعداد هذه الخريطة إنشاء قاعدة بيانات عن الخامات والمصادر المعدنية في مصر- متاحة بمركز المعلومات بالهيئة لكل المهتمين من أبناء الهيئة أو العاملين بالجامعات والمعاهد البحثية وكذلك رجال المال الراغبين في الإستثمار بهذا المجال.

فشكراً لأكاديمية البحث العلمي والتكنولوچيا علي ثقتها ودعمها - وشكراً لعلماء مصر المتخصصين في مجالات الثروة المعدنية المختلفة الذين شاركوا أبناء الهيئة في هذه الدراسة - وشكراً للمخلصين من أبناء الهيئة الذين لم يبخلوا بجهدهم لإنجاح هذا المشروع القومي الجدير بكل ما بذل في سبيله من جهود.

والله ولي التوفيق...

المحتويات

تقديم

أ.د/ أحمد حمدي سويدان

رئيس هيئة المساحة الچيولوچية والمشروعات التعدينية
(جهة الإسناد الرئيسية)

في ۱۹۹۰/٦/۳۰ أسندت أكاديمية البحث العلمي والتكنولوچيا (مجلس بحوث الثروة المعدنية) إلي الهيئة تنفيذ المشروع القومي للخريطة الميتالوچينية فى إطار مشروعات الخطة الخمسية ۸۷ - ۱۹۹۲.

وكان هذا الإسناد بناء علي خبرة هيئة المساحة الچيولوچية والعاملين بها فى إعداد واصدار الخرائط النوعية المتخصصة حيث سبق لها إصدار لوحتين (قنا وأسوان) مقياس ۱ : ۵۰۰۰۰۰ من الخريطة الميتالوچينية لمصر، كما أنها أبدت الإستعداد للإسهام فى إعداد الخريطة إسهاماً عينياً وصل إلي ثلاثة مليون جنيه في مقابل إسهام الأكاديمية بمليون جنيه نقداً.

ورأت الهيئة أن تشرك معها في إعداد هذه الخريطة الميتالوچينية (۱: مليون) علماء أفاضل من كافة الجامعات والمعاهد البحثية المصرية حتي تكون الخريطة عملاً قومياً متميزاً أسهم في تحقيقه كل من كانت لديه الرغبة والمقدرة على الإسهام:

والآن - والحمد لله - صدرت الخريطة الميتالوچينية فى ۹ لوحات وملاحق أربعة - وزعت على العاملين في مختلف جوانب الثروة المعدنية- استكشافاً ودراسة وتقييماً ثم إستثماراً وتصنيعاً